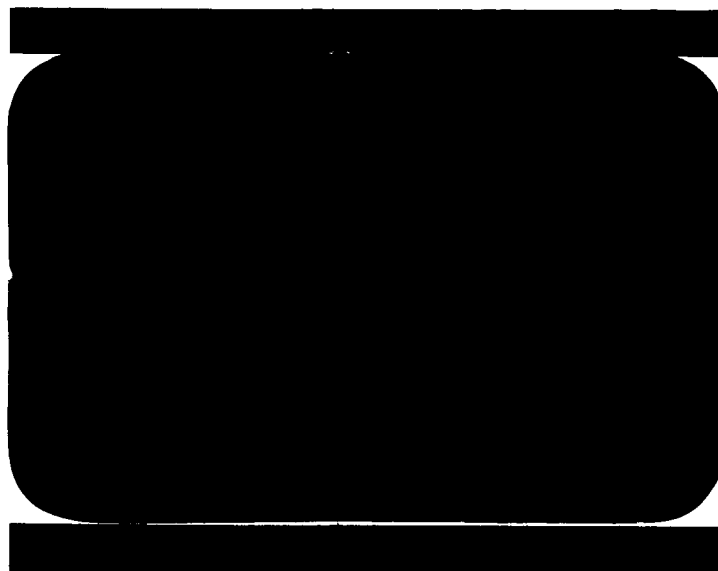


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**GENERAL DYNAMICS**  
*Convair Division*

# CONVAIR ASTRONAUTICS

CONVAIR DIVISION OF GENERAL DYNAMICS CORPORATION

## PROPERTIES OF 321 STAINLESS

STEEL JOINTS AT ROOM

TEMPERATURE AND -423°F

REPORT NO. 55E 154

*under NAS 3-3232*

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### REVISIONS

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PROPERTIES OF 321 STAINLESS STEEL JOINTS AT  
ROOM TEMPERATURE AND -423°F

OBJECTIVE:

The purpose of this investigation was to determine the static strengths of joints in 321 annealed stainless steel at room temperature and -423°F.

CONCLUSIONS:

The ultimate strengths of each type joint was determined and the average values are shown in the following table.

	AVERAGE ULTIMATE STRENGTH (KSI)		
	Resistance Lapweld	Heliarc, Burn-Down Flange Joint	Heliarc, Fillet With Splitter, Joint
R.T.	90.6	90.1	87.2
-423°F	175.3	131.8	157.8

The resistance lapweld was found to have the highest joint strength.

The strength of each type joint was much higher at -423°F than at room temperature.

SPECIMEN:

Specimens were nine inch standard tensile test coupons of 321 annealed stainless steel with welds located in test section of the coupon. The joints were of three types: (1) resistance lapweld, (2) heliarc fillet with splitter, and (3) heliarc burn-down flange.

The resistance lapweld joints were made with 0.0134 inch thick material.

The heliarc fillet with splitter joints were made with 0.0186 inch thick material.

The heliarc burn-down flange joints were made with 0.0136 inch material.

PROCEDURE:

Room temperature testing was done with a Tinius Olsen 200,000 lb. test machine.

Testing at -423°F was accomplished with facilities at the Liquid Hydrogen Test Area. The equipment consisted of a cryostat, a hydraulic ram, and an extensometer. The output of the extensometer was connected to an X-Y recorder which also received an input from a load cell.

Specimens were immersed in liquid hydrogen before any load was applied to the specimen. When the cryostat was completely full, the hydraulic ram was activated and the X-Y recorder turned on to record the load-strain curve of the specimen. The specimen was loaded until failure occurred and the ultimate load was determined from the load-strain curve.

RESULTS:

The ultimate strengths for each joint type are presented in Figure 1.

NOTE:

The test data from which this report was prepared are recorded in MLRs 343, 344 and 1719.

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